MORMON CRICKETS

AND THEIR CONTROL

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THE MORMON CRICKET attacks both range plants and cultivated crops, chiefly in the Intermountain and far Western States. It is dreaded there because of its sudden appearance in overwhelming numbers. Although incapable of flight, it frequently travels many miles in immense numbers by hopping and crawling, devouring much of the herbaceous vegetation as it goes. It feeds on at least 250 kinds of range plants and on most cultivated crops, including the small grains and alfalfa, but it prefers truck crops and young sugar beets.

The best method of control is through distribution of a bait in which the poisoning agent is sodium fluosilicate, wheat bran or mill run bran being used as a carrier for the poison. Arsenic in any form cannot be used, since it acts as a repellent to the insect.

Auxiliary control measures are the production of a thin film of light oil on irrigation ditches and streams which the crickets are attempting to cross, and the construction of barriers; but these are considered as emergency measures and are not dependable for general control.

Farmers should consult their county agricultural agents regarding the availability of materials for Mormon cricket control.

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MORMON CRICKETS AND THEIR CONTROL

By F. T. COWAN, *associate entomologist*, and H. J. SHIPMAN, *junior entomologist*, *Division of Cereal and Forage Insect Investigations*, and CLAUDE WAKELAND, *Chief, Division of Grasshopper Control, Bureau of Entomology and Plant Quarantine*

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CERTAIN SPECIES of long-horned grasshoppers, commonly called crickets, have been important pests of agriculture in the western part of the United States since settlement of the area began about 1848. Great swarms of these insects swept down from the surrounding mountains and threatened complete destruction of crops and the ultimate starvation of many of the early settlers. Such migrations into the early Mormon settlements in Utah were responsible for the name "Mormon cricket,"[1] by which the most important species has since been known. During the last half of the nineteenth century hardly a year passed that did not carry with it the threat of crop loss from these insects in some area.

The largest and most widespread of the earlier outbreaks recorded occurred during the period 1900 to 1904, inclusive, when crickets were reported from at least 8 Western States. This outbreak subsided in 1905, and other outbreaks were not reported until 1914, but after that time cricket outbreaks were reported every year from some part of the Rocky Mountain region. The most recent outbreak reached a peak in 1938, when serious infestations were reported in 11 Western and Rocky Mountain States. If past experiences are repeated, Mormon crickets will continue to be one of the major pests of agriculture in the West.

REGIONS WHERE OUTBREAKS OCCUR

Prior to 1937 cricket outbreaks were confined to the following Rocky Mountain States: Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. In 1937 and 1938, infestations of con-

[1] *Anabrus simplex* Hald.

siderable intensity appeared in parts of South Dakota and of lower intensity in Nebraska and North Dakota (fig. 1). In South Dakota the infestation extended eastward beyond the Missouri River. In Nebraska and North Dakota the infestations were not of economic importance.

CROP LOSSES CAUSED BY MORMON CRICKETS

The actual amount of damage done by Mormon crickets in the West is exceeded by that of other insects. However, the suddenness and severity of the attack by the crickets on range and cultivated crops and the overwhelming numbers in the attacking bands make them one of the most spectacular and dreaded of all the insect enemies of the western farmer.

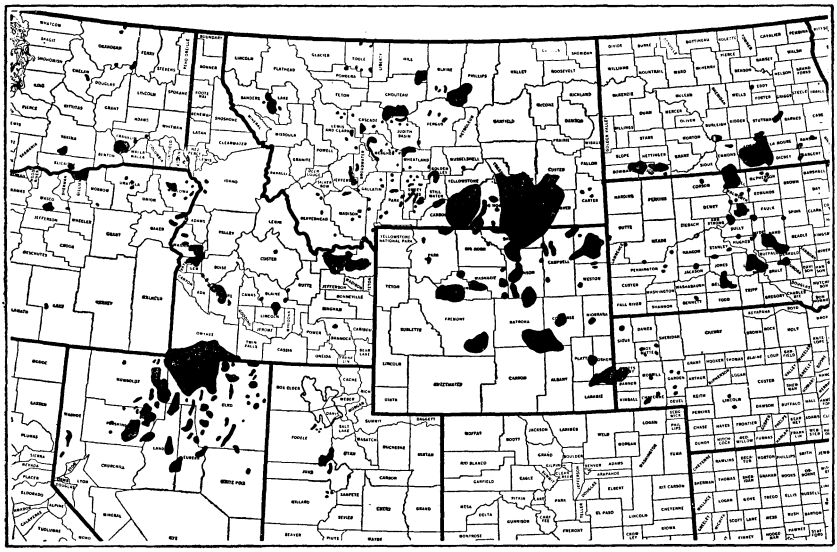

FIGURE 1.—Localities where Mormon crickets occurred in 1938.

In outlying dry-land farms all crops are subject to attack from migrating crickets, and it is from such areas that most of the reports of damage have come. In Montana in 1936, a year when no control was attempted, it was estimated that over 150,000 bushels of wheat were destroyed by these insects on the Crow Indian Reservation alone. In Sanders and Lake Counties, Mont., in 1926, the damage to crops exceeded $100,000. Since then intensive control campaigns have given protection to millions of dollars' worth of crops and have reduced losses to a minimum, except in isolated cases. No one can estimate the probable damage to crops during the last 5 years (1937–41) if no control had been undertaken. Undoubtedly it would have aggregated hundreds of thousands of dollars.

FOOD PLANTS

According to data gathered in 1938, more than 250 kinds of range plants were fed upon by the Mormon cricket. This number is in addition to the crop plants noted in earlier studies. Forty-seven of these range plants were grasses, 180 were weeds, and the remainder were browse and grasslike plants. In general, the plants with fleshy, succulent leaves, such as balsamroot, dandelion, the mustards,

FIGURE 2.—Cricket damage to ripened wheat. Many kernels have been removed and eaten. This is the most common type of injury and is frequently unnoticed until the crop is threshed.

bitterroot, and young Russian-thistle, are preferred. Most cultivated crops, including small grains and alfalfa, are eaten, but truck crops, including young sugar beets, are preferred.

CROPS DAMAGED AND TYPES OF INJURY

Considering the Rocky Mountain region as a whole, the greatest injury is done to wheat and other cereals. A large percentage of

these crops, especially wheat, is grown on nonirrigated lands and is more susceptible to attack than crops grown on irrigated lands. Wheat may be damaged in any one of three stages. The first stage is during the growing period. The damage done to the leaves of the young plants is distinct from grasshopper damage in that the leaves are shredded rather than eaten entirely. With fair moisture conditions, most of the plants will recover from this early injury, and usually the only damage sustained is a thinning of the stand. The next vulnerable stage for the wheat plant is while it is in the "boot" or just before it begins to head. Injury then is done by the crickets cutting through the outer sheath and feeding on the succulent inner parts of the plant. Heads thus damaged fail to emerge from the sheath and soon dry up. The third and perhaps most important stage is during and after the formation of the kernels

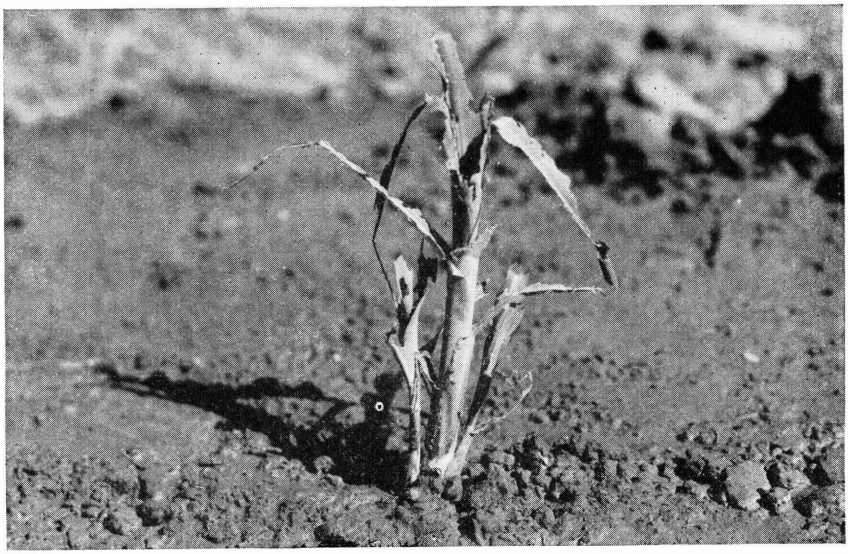

FIGURE 3.—Cricket damage to sweet corn.

(fig. 2). This period continues from the time the kernels have reached the milk stage until the wheat is harvested. In this type of injury the kernels of wheat are removed and eaten, while the remainder of the head is left standing on the stalk. Other cereal crops are damaged in much the same way as is wheat.

Alfalfa is probably second to wheat in importance with regard to the amount of damage sustained. Generally the leaves are consumed, leaving only the bare stalks.

Most kinds of truck crops are eaten by Mormon crickets. Much of the important damage done by these insects is to farm gardens (fig. 3). Many families living on isolated farms depend largely on garden products for their year-round food supply. The products of these gardens, while hard to measure in dollars and cents, are all-important to the families depending on them for food.

Injury to range plants by Mormon crickets has been rather general over the entire Rocky Mountain area, but is most severe on the sage-

brush and rabbitbrush ranges in Nevada. More than 2 million acres were reported damaged in that State in 1939, with a loss in stock-carrying capacity ranging up to 40 percent. The loss per acre is not great, considering the fact that the average value of the forage produced on an acre of range probably does not exceed 10 cents. As explained below, however, an indirect effect of such loss is of great concern to the average stockman.

In normal years a range is stocked to the limit of its carrying capacity. If such capacity is reduced by even 25 percent, the stockman has to lease more range to support his stock properly. In most cases additional range is not available, which leaves him no choice except to reduce the size of his herd to the point where he has range and feed sufficient to carry it. In many cases owners are forced to sell breeding stock, which must be replaced at a future date at a price likely to be unfavorable.

LIFE HISTORY AND DESCRIPTION

The eggs of the Mormon cricket are about one-fourth inch long, rounded at the ends, and slightly curved (fig. 4). They are chocolate

FIGURE 4.—Eggs of the Mormon cricket, natural size. These eggs were dug from an area 2 inches square.

brown when first laid, but on coming in contact with the soil they soon change to a pearly gray. As the embryo crickets within the eggs develop, the eggs appear dull gray and become somewhat enlarged at one end. By the time the ground freezes in the fall the young crickets are fully developed, and they are ready to hatch when the ground warms up in the spring. Hatching may begin as early as the last of February, but normally starts about April 1. Fall hatching has never been observed under field conditions.

When they emerge from the eggshells the young crickets are about one-fourth inch long. They are black, with white markings on the extreme outer edge of the shield, which is located just back of the head. Except for size and color, they closely resemble their parents. When the nymphal crickets are about one-third grown their color may vary from light green or tan to black, with various colors and shades for individual crickets. They require about 60 days, depending on weather conditions, to reach maturity.

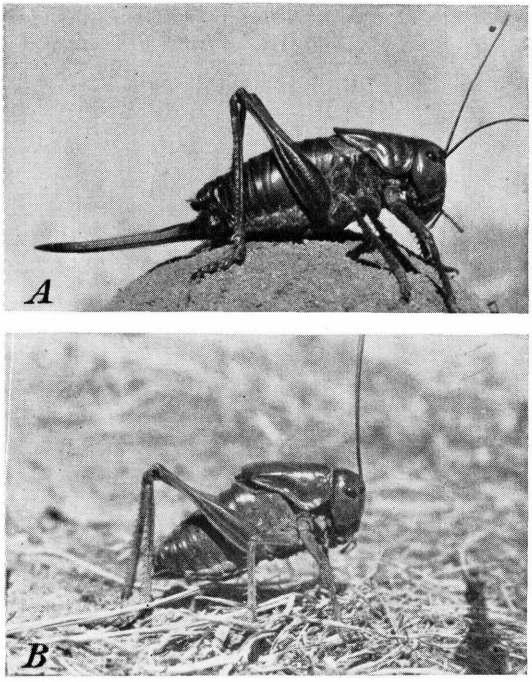

FIGURE 5.—*A*, Adult female Mormon cricket; *B*, adult male Mormon cricket. Natural size.

On reaching maturity the adult female Mormon cricket attains a length up to 1½ inches, including the swordlike egg-laying organ, called the ovipositor (fig. 5, *A*). The male is somewhat smaller, and bears no appendage resembling an ovipositor (fig. 5, *B*). Color combinations of both male and female adults are similar to those found in the nymphal stages. As the adults grow older their color becomes a uniform dark brown to nearly black.

HABITS

EGG LAYING

About 10 days after they reach the adult stage the females are ready to start mating and laying eggs. The egg-laying period is marked by much "singing" among the males during the forenoons. Each female may lay as many as 250 eggs, although the average

number is probably nearer 150. The eggs are laid in batches over a 1- to 2-day period, which is followed by a resting period of from 4 to 6 days.

The eggs are inserted from ¾ to 1¼ inches under the soil surface in the bare spots between grass clumps, although in some of the more sandy sections in Washington and Idaho they are laid in the crowns of bunchgrass (fig. 6). A light, sandy loam soil, in elevated,

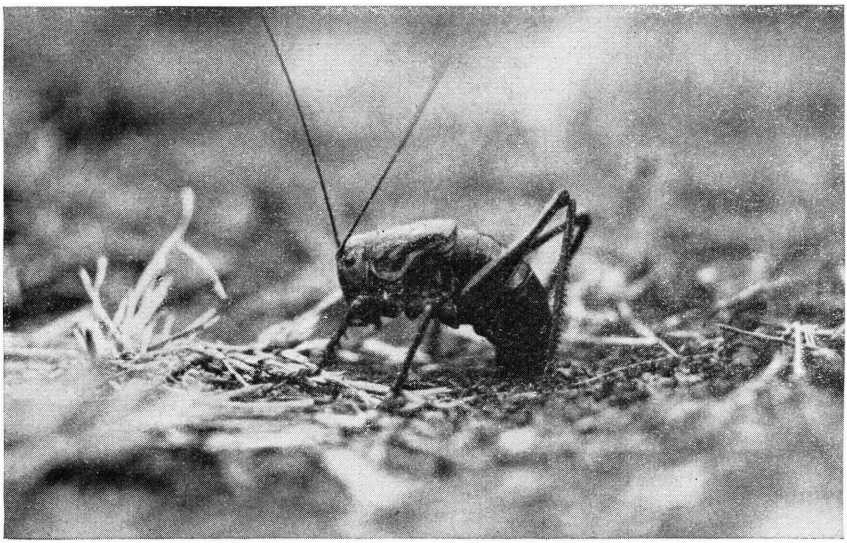

FIGURE 6.—Female Mormon cricket laying eggs.

well-drained locations, is usually chosen for egg laying. Heavy clay or gumbo soils are avoided. South, east, or west slopes are preferred to north slopes, although eggs often are deposited in favorable areas on north exposures. Timbered slopes usually are avoided, yet many eggs are laid in sagebrush areas.

Unlike grasshopper eggs, which are deposited in a pod, cricket eggs are laid singly. Often as many as 100 are found closely grouped. These may or may not have been laid by a single female. More than likely, several females found the spot to their liking, and each laid one or more eggs.

MIGRATIONS

Migration is a very pronounced characteristic of Mormon crickets throughout their active lives. Their movements are governed largely by temperature, although they may be influenced by sky conditions and wind. Migrations take place on clear or partially cloudy days with air temperatures of 65° to 95° F. and soil-surface temperatures of 75° to 125°. Migrations cease when the wind reaches a velocity of 20 to 25 miles per hour.

From the time the Mormon crickets hatch until they die, some migration takes place each day if temperatures and other conditions

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are favorable. During the first two or three stages of growth their movements are concerned mainly with seeking shelter or food. These early movements cause them to concentrate in small groups in sheltered places. Later these groups merge into larger bands until, by

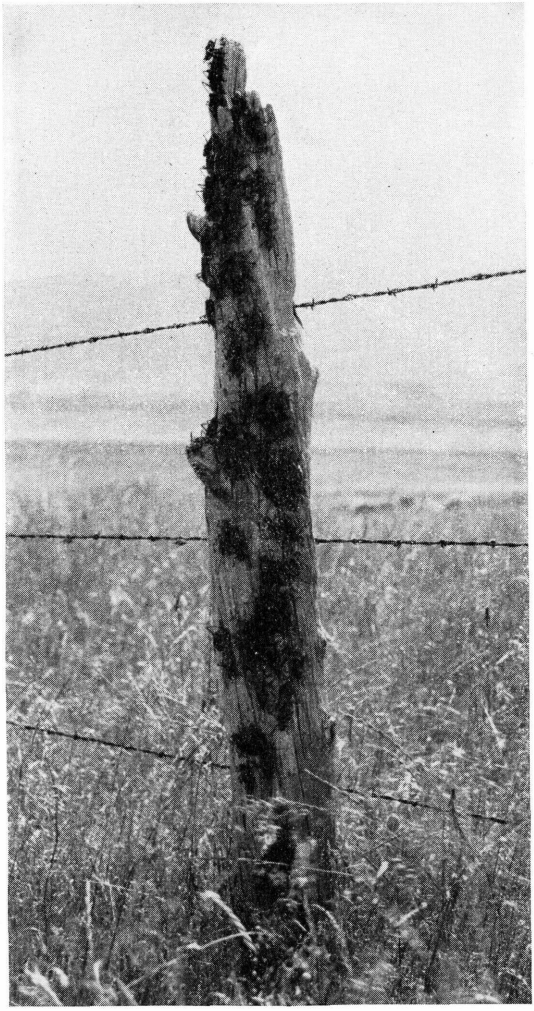

FIGURE 7.—Adult crickets roosting on the shady side of a fence post during the heat of the day. (Photograph by C. L. Corkins.)

the time the crickets have reached the fourth and fifth stages of growth and the migrations become general and pronounced, the bands may cover hundreds of acres. Migrations continue until egg laying starts. Movements of bands thereafter are away from and returning to the egg-laying beds.

A cricket band performs as a unit. All crickets within the band move in the same direction and continue to do so unless the band is disturbed or is split by some insurmountable object. Even so, they

often reassemble after the disturbance or after the object has been passed.

The direction of migration of any one particular band of crickets is not governed by any known force, such as wind, sun, or other climatological factors, nor do the bands always move toward crops or better food.

Observations have shown that crickets are capable of traveling approximately one-half mile a day. Estimating that there are 50 favorable days from the time when migrations start until egg laying begins, a band may travel 25 miles in a single season.

REACTIONS TO TEMPERATURE

Mormon cricket activities other than migration, such as feeding, shelter seeking, clustering on warm, bare ground, and roosting on brush, grass, or weeds during the heat of the day, are governed by temperature. Fortunately, from a control standpoint, migration and feeding take place within the same range of temperatures. That is to say, when crickets are migrating, some individuals pause momentarily to feed, even though the band as a whole continues its forward progress. When the temperature is too low for migrating, crickets usually are bunched in sheltered places or clustered on bare spots. When the soil and air temperatures rise above the range favorable for migrating, crickets will be found roosting on plants or objects above the ground in a more comfortable air stratum (fig. 7). A study of the reactions of crickets to temperature and other weather phenomena has led to a better understanding of control methods.

HOW OUTBREAKS DEVELOP

The capacity of crickets for reproduction, like that of many other insects, is governed in part by weather conditions. There is evidence, however, that crickets are capable of maintaining themselves in noninjurious numbers in localized, permanent breeding areas during periods of weather apparently unfavorable to their maximum reproductive capacity in adjacent territory. These permanent breeding areas are located in fairly high mountain ranges, well covered with vegetation and surrounded by scabland foothills (fig. 8). Such ranges as the Big Horn Mountains in Wyoming, the Pryor Mountains in south-central Montana, and the Ruby and Independence Mountains in Nevada are excellent examples. Year in and year out crickets exist in limited numbers in permanent breeding areas until conditions become favorable to their maximum reproduction. At such times they leave the permanent breeding areas and infest adjacent range and farm lands. This may be accomplished in 1 year, but usually 2 or 3 years are required after the beginning of an outbreak.

PRINCIPAL CONTROL MEASURES

Crickets, unlike many other insect pests, do not increase to outbreak numbers on farms. Usually their raids on farm crops come without warning and demand immediate action on the part of the farm operator. This is especially true in the case of isolated farms lying adjacent to permanent cricket-breeding areas, where, in order to

protect crops, it is necessary at such times to bring to bear every known means of control. Ordinarily the average farmer is not properly equipped or well enough informed to cope with a serious cricket infestation; therefore, by the time help is secured, it is possible for the insects to have injured his crops seriously.

It is desirable, during nonoutbreak cycles, that all agencies interested in cricket control be organized into a unit to report impending outbreaks and to prevent infestations from reaching outbreak

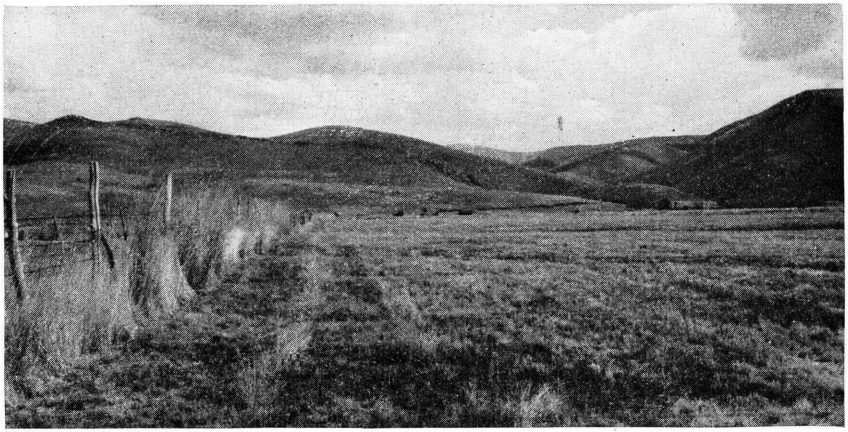

FIGURE 8.—Typical Mormon cricket environment. Independence Mountains, Nev.

proportions by controlling them at their sources in permanent breeding areas. Such a unit must have the close cooperation of all agencies concerned, but if properly organized it would serve effectually in preventing major outbreaks and would eliminate migrations, with the resultant crop destruction and the consequent necessity for expensive control campaigns.

POISONED BAIT

Poisoned baits have been used for many years in grasshopper control, but prior to 1940 they were not recommended for the control of Mormon crickets because it was impossible to obtain consistently good kills with the baits commonly used. As a result of research begun in 1935, a bait was developed that has proved to be effective in Mormon cricket control during a 3-year test and demonstration period in the field. Control by the use of poisoned bait has rapidly replaced other methods (such as applying a dust containing sodium arsenite to the crickets) used by individual farmers and by field crews in large-scale campaigns. The baiting method is now recommended as the cheapest and most practical.

Materials and Formulas Recommended

The following formulas are recommended in the order of importance as listed:

Standard bran formula

Standard wheat bran (no shorts or middlings)	100 pounds.
Sodium fluosilicate (powder)	4 pounds.
Water	12 to 15 gallons.

The standard bran used in this formula may be purchased from most flour mills or feed stores. It should be free from shorts and middlings because the presence of these materials causes the bait to lump when mixed with water and makes it difficult to spread.

Sodium fluosilicate is a fine, white powder, very toxic to crickets, but only about one-tenth as toxic to warm-blooded animals as is sodium arsenite or arsenic. It is poisonous, however, and should be handled with care. It is sold by several of the large chemical companies, but should be bought through the county agent in large quantities in order to take advantage of lower rates offered on large purchases. Sodium fluosilicate will keep indefinitely if stored in a tight container in a dry place.

Standard bran-and-oil formula

During 1940 a new bait was developed in which from 1 to 1½ gallons of cheap lubricating oil was substituted for the water in 100 pounds of the standard bran formula. This is superior in some respects to the bait mixed with water. It does not dry out and cake, and it can be stored for long periods of time and is always in proper condition for immediate use. It does not spread so well by hand as does wet bait, but it handles very well in spreading machines.

Millrun bran-and-sawdust formula

Millrun bran	25 pounds.
Sawdust (3 times the bulk of millrun bran)	3½ bushels.
Sodium fluosilicate	4 pounds.
Water	8 to 10 gallons.

The millrun bran recommended in this formula contains most of the shorts and middlings. It is necssary to add the sawdust in order to produce a mixture that will not lump when the water is added.

Either hardwood or softwood sawdust may be used. Moderately fine sawdust is preferable to coarse. The sawdust should be well drained and in such physical condition that it may be readily screened. It should be screened through a half-inch-mesh screen to remove chips, bark, etc. Sawdust from pine, fir, or spruce timber should be aged at least 2 years in the pile before being used. Sawdust from trees other than conifers may be used without aging.

In areas where cricket bands predominate and where the infestation might be classed as "moderate" to "heavy," the standard bran formula is recommended. This formula is somewhat more expensive than the one containing sawdust, but the increased cost appears to be justified, for it has given the highest and most consistent kills under all conditions. Furthermore, crickets are known to feed readily on this bait after it has been spread and has dried on the ground. In other words, it is effective as long as any of it remains on the ground, or until the poison is washed off by heavy rains.

In areas of mixed grasshopper and cricket populations, or where the cricket infestation is scattered, the millrun bran-and-sawdust formula is recommended. This bait is just as effective against grasshoppers as it is against crickets and has the advantage of being cheaper than the standard bran bait. Although it may not always kill as high a percentage of crickets as the standard bran bait, its proper use in areas

of light infestation should decrease the numbers sufficiently so that little damage will result from those remaining alive. The dry oil bait is not effective against all species of grasshoppers.

Mixing the Bait

In making the baits containing water, all the dry ingredients are mixed thoroughly and then sufficient water is added to make a wet mash that will spread readily without lumping. The exact quantity of water varies according to the character of the bran and sawdust used. In making the bait containing oil, the oil is added after the dry ingredients are mixed.

The bait can be mixed by hand on a tight floor or in a wagon box or similar container. In mixing the standard bran formula the bran is spread out evenly over the floor to a depth of 6 or 8 inches, the required amount of sodium fluosilicate is scattered evenly over the bran, and the two ingredients are then thoroughly mixed by turning with shovels. Water is then added in two or three applications, and the mixture is turned with shovels after each wetting. In mixing the standard bran-and-oil formula the mixing process is the same as for the standard bran formula except that oil, instead of water, is added to the dry mix. In mixing the millrun bran-and-sawdust formula, the sawdust is spread out evenly over the floor to a depth of 6 or 8 inches, the required quantities of bran and sodium fluosilicate are scattered evenly on top of the sawdust, and the dry ingredients are thoroughly mixed by turning with shovels. The water is then splashed over the dry ingredients in three applications. The mixture is turned with shovels after each wetting.

Good results depend upon mixing the wet bait or oil bait thoroughly until it contains no lumps and is uniformly moist or oily throughout.

In extensive campaigns where many tons of bait are used in an area the best results are obtained by establishing central mixing stations which can serve one or more counties. A small crew properly supervised and using mechanical bait mixers can prepare a more uniform bait at less cost than it can be mixed by hand. Information on the construction and operation of a central mixing station may be secured from county agricultural agents.

Time to Spread the Bait

Bait prepared from the standard bran formula or from the standard bran-and-oil formula may be spread at any time of day, but preferably while the insects are migrating. If spread then, the insects will feed immediately (fig. 9) and results will begin to appear in about 24 hours. If it is spread while the insects are inactive, the percentage of kill will be smaller and effects may be delayed by as much as 24 hours.

Bait prepared from the millrun bran-and-sawdust formula is more effective if spread on bright, sunny days, while the insects are migrating.

How to Spread the Bait

Poisoned bait may be spread by hand from a wagon or truck or on foot in a manner similar to the broadcasting of seed. It may also

be spread with mechanical or power spreaders, of which there are several types in use, and with airplanes. Mechanical and power spreaders distribute the bait much more economically, rapidly, and uniformly than is possible by hand. Plans for building a power spreader may be obtained from the county agricultural agent.

In heavy infestations (15 crickets or more per square yard) the bait should be broadcast uniformly over the entire infested area at the

FIGURE 9.—Migrating crickets which have stopped to feed on poisoned bait.

rate of 10 pounds of bait, dry weight, per acre. Where the infestation is moderate or light (less than 15 crickets per square yard) the ground may be strip-baited. This procedure consists of baiting a strip of ground a rod wide and then leaving a strip unbaited. In moderate infestations (5 to 15 crickets per square yard) the unbaited strips should be about the same width as the baited strips. In light infestations (less than 5 crickets per square yard) the unbaited strip may be three times as wide as the baited strip.

By strip baiting, the area that one baiting unit can cover in a day is doubled in moderate infestations and quadrupled in light infestations; i. e., 100 pounds of bait (dry weight) will control the crickets

on 10 acres heavily infested, on 20 acres moderately infested, and on 40 acres lightly infested.

Bait should always be spread across the direction of migration, starting the strips in advance of the head of the band and working back toward the rear. This is also the proper procedure when an entire infested area is being baited uniformly.

Precautions in the Use of Bait

(1) Cricket bait should not be mixed in containers that have been used in mixing grasshopper bait of which sodium arsenite is one of the ingredients. Mixed bait or bait materials to be used for cricket control should be kept away from buildings in which sodium arsenite dust (cricket dust) has been mixed or stored.

If a bait mixer has previously been used for preparing bait containing arsenic, it must be thoroughly washed out before it is used to prepare bait containing sodium fluosilicate. Sodium arsenite is very unpalatable to crickets, and the slightest amount of it in bait renders it unattractive to them.

(2) The bait containing sodium fluosilicate should be kept away from livestock and irresponsible people, even though it is less toxic than arsenic to warm-blooded animals. When it is spread in the recommended amounts there is no danger of poisoning livestock, poultry, or game birds. Workers at mixing stations should avoid breathing the dry sodium fluosilicate dust and should wear rubber gloves. Mixing should be done out of doors where practicable. Laborers and attendants should wear respirators. All persons working with sodium fluosilicate dust should wash frequently and bathe daily with soap and water, and not wear clothing contaminated with the dust.

SUPPLEMENTAL CONTROL MEASURES

USING OIL-ON-WATER BARRIERS

The use of oil on irrigation ditches and streams is one of the cheapest and most effective control methods known. Its use is one of the principal reasons why, in recent years, crickets have seldom caused widespread damage to irrigated crops. When migrating crickets encounter a stream or irrigation ditch they unhesitatingly plunge into the water, kick themselves into the current, and float. They may be carried along for miles before they again come in contact with the shore. In this way streams and ditches form a means of distribution and often spread infestations for miles. However, with the proper application of oil to the surface of the stream, it promptly becomes a death trap instead of a means of transportation to the crickets.

How and Where To Use Oil

The common practice of oiling ditches consists of distributing barrels of oil along the stream at intervals of ½ to 1½ miles. The oil is allowed to drip through a small hole in a barrel onto the surface of the water (fig. 10). The proper size of this hole varies in diameter from that of a shingle nail to that of a lead pencil, depending on the size and rate of flow of the stream to be treated and the type of oil used. The important point is to maintain a thin, continuous film of oil on the surface of the water.

Proper Oil To Use

The important qualities to be considered in purchasing oil are its cheapness and its ability to form a film quickly over the surface of the water. One of the oils that meets these qualifications is a low-grade distillate. Oil that floats in large globules without forming a film is unsatisfactory. Some of the cheap crude oils, however, film almost as readily on warm water as do distillates. Several character-

FIGURE 10.—Method of creating an oil film on flowing water. Note the drip from the barrel on the right.

istics may render crude oils unsatisfactory for general use. Most crude oils contain quantities of sludge that clog the opening in the barrel, necessitating constant attention if a continuous oil film is to be maintained. Crude oil is very unsightly on vegetation along the stream banks and it does not film well on cold water. Although less desirable, crude oil or crankcase oil may be substituted for distillate if distillate is not available.

Water from oiled irrigation ditches can be used for irrigation without injury to crops by following a simple procedure. Where the water is taken out of the main ditch into a lateral, a baffle board may be placed in front of the head-gate so that it rests about 2 inches below the surface of the water in the main ditch. In this way the water entering the lateral is drawn off beneath the oiled surface.

USING FENCE AND TRENCH BARRIERS

The use of bait has eliminated fence and trench barriers from well-organized large-scale control campaigns. Strips baited crosswise to an advancing band of crickets check them as effectively as barriers, at much less cost, and with the advantage of killing the insects in-

stead of diverting them. Cricket bands sometimes appear unexpectedly in localities where the need for control has not been anticipated. Under such conditions fence or trench barriers may be used to advantage until bait can be secured. They also have a place in protecting crops and gardens on isolated ranches from repeated invasions of crickets from surrounding unbaited range land, but it should be emphasized again that in large-scale operations they are seldom as effective or economical as baiting.

Several types of fences or barriers have been devised and used during the last 15 years. Each, regardless of how constructed, should form a barrier over which the crickets cannot climb. The type most commonly used consists of a 10-inch strip of 28- or 30-gage galvanized iron set on edge and held in place with stakes driven into the ground on the side away from the migrating bands (fig. 11).

FIGURE 11.—Migrating Mormon crickets stopped by a metal barrier erected along a roadside. Baiting crickets on smooth ground along a barrier, after they become densely massed, is sometimes cheaper and more effective than baiting smaller numbers scattered widely over rough ground. (Photograph, courtesy of Lee M. Burge, Nevada State Department of Agriculture.)

ORGANIZING FOR MORMON CRICKET CONTROL

LARGE-SCALE COOPERATIVE CONTROL WHEN FEDERAL FUNDS ARE AVAILABLE

Mormon cricket control, in areas where the insects occur in heavy outbreak numbers, demands the complete cooperation of farmers, livestock owners, the county and State governments, and all interested Federal agencies. Although individuals can effectively control small, local outbreaks, they are soon overwhelmed when extensive bands of crickets migrate to their crop lands from surrounding range areas. Control programs administered uniformly by the Bureau of Entomology and Plant Quarantine in cooperation with State and county governments have been most successful in meeting such situations.

INDIVIDUAL AND COOPERATIVE CONTROL WHEN FEDERAL FUNDS ARE NOT AVAILABLE

With the development of an effective bait, Mormon cricket control is now being conducted by individuals in many counties. For many years farmers have protected their crops from attacks by grasshoppers by spreading poisoned bait. It is now practical to control local outbreaks of Mormon crickets in the same manner.

If crickets are present in such numbers that they are likely to migrate to several farms or ranches, community or countywide action becomes necessary. This can be secured only through proper education, organization, effective leadership, and adequate financial backing. Unless a suitable organization already exists, one should be started.

Educational and organizational work in all the infested counties of a State usually are conducted by or under the direction of the State leader in cricket control or the State entomologist.

One county leader, usually the county agricultural agent, should be in charge of the control campaign in the county. Under direction of the State leader, he should be responsible for instructing community leaders in control methods, for the expenditure of funds, and for the requisitioning or purchasing of supplies. Community organization within a county should be in accord with the general plan recommended by the State leader and the county leader, and adapted to fit the particular county conditions.

Farmers interested only in controlling Mormon crickets on their own land should consult their county agricultural agent, who is prepared to assist them in securing bait materials. Counties or communities interested in cooperative control should apply to their State leader for assistance in organizing and in obtaining bait materials.

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